OPERATING AND MAINTENANCE INSTRUCTIONS

MODEL 377

DUAL - CHANNEL TAPE REPRODUCE AMPLIFIER

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INOVONICS
INCORPORATED

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(408) 374-8300

I. GENERAL INFORMATION

The Inovonics 377 is a self-contained, dual-channel magnetic tape reproduce amplifier for professional applications. Designed primarily for broadcast "automation" systems, the 377 also finds use in background music installations, tape duplicator "Q.C." checkers and other basic, single-speed uses.

Features of the 377 include:

Accommodates virtually any tape reproduce head. -01 option can be strapped for either Hi-Z or Lo-Z head windings.

Low noise design utilizes an optimum combination of IC and discrete circuitry for lowest residual electronics noise.

Wide equalization adjustment range for both NAB and IEC recording characteristics, 1-7/8 to 30ips.

Multi-turn trim adjustments and fully regulated power supply assure stability of settings and drift-free operation.

Entire electronics amplifier subassembly unplugs from the front panel for ease of maintenance.

II. INOVONICS 377 SPECIFICATIONS

NOTE: Performance will obviously depend on the reproduce head used. Specifications were derived utilizing a Nortronics 9213 head, with an inductance of 400mH and two 70-80 mil tracks.

Frequency Response (in Hz):

15ips	±2dB,	30 - 22k
7-1/2ips	±2dB,	20 - 18k
3-3/4ips	±3dB,	20 - 14kHz

Signal-to-Noise Ratio (STANDBY in dB):

	u'wtd.	wtd.
15ips	-70	-81
7-1/2ips	-70	-81
3-3/4ips	-69	-80

(referenced to a "peak" record level 6dB above 200nW/m, or approx. 3dB below 3% THD point of 3M 206 tape)

Amplifier Distortion:

<0.1% THD at +4 or +8dBm output
<0.3% THD at +22dBm output (Clipping level +24dBm)

Output:

Transformer-isolated, feeds 600 ohm line or bridging inputs, balanced or unbalanced, at +4 or +8dBm for zero-VU.

Recommended Reproduce Head Inductances:

-00 version - 200mH to 1H, 400mH optimum
-01 version - same as -00 or strappable for 3 to 6mH, 4mH optimum

Panel Controls:

POWER (via fuseholder) and LEVEL TRIM (±5dB) for each of two channels.

Trim Adjustments:

GAIN CAL., H.F. and L.F. EQUALIZATION for each of two channels.

Power Requirement:

105 - 130VAC (230V available), 50/60Hz; 1/4A (plus transport, if powered by Model 377).

Size and Weight:

3-1/2" X 19" X 6"; 7 lbs.

III. INSTALLATION

Upon receipt of the equipment, inspect at once for shipping damage. Should such damage be observed, notify the carrier at once; if not, proceed as outlined below. It is suggested that the shipping carton and materials be retained should future re-shipment become necessary.

Mounting

The Inovonics 377 is packaged to mount in a standard 19-inch equipment rack, requiring only 3-1/2 inches of panel space for each two channel unit.

Connection

The reproduce head connectors are the standard 3-pin "MS" style commonly encountered in professional recorders.

The two Line Outputs are brought out to a rear-panel "barrier" screw-terminal strip. Outputs should be terminated in 600 ohms. If the load does not represent a 600-ohm termination, fixed resistors may be bridged across the output terminals.

A captive cord connects with primary AC power, and a 6-pin "Jones" connector provides power to the tape transport, if required.

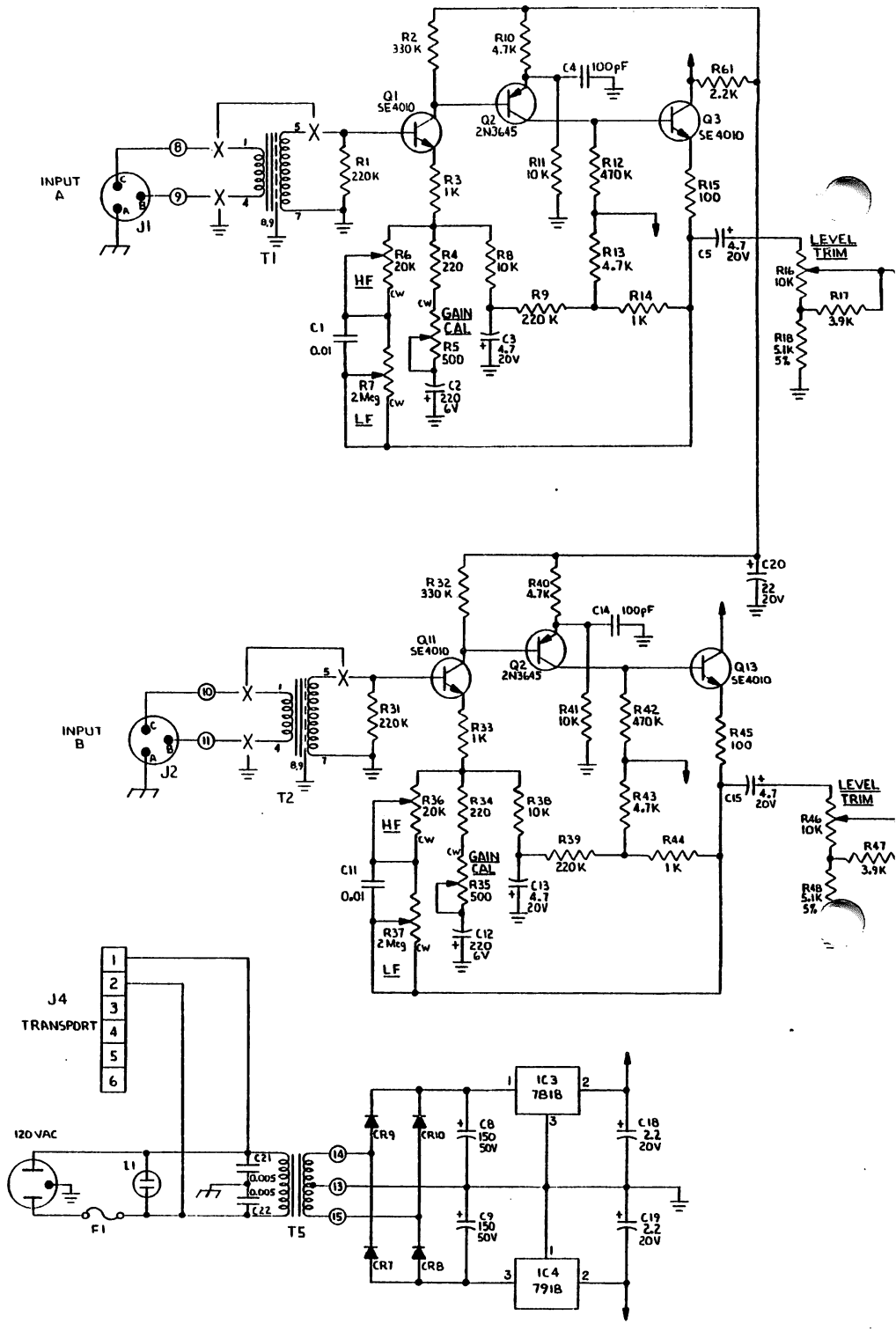
IV. OPERATION AND CALIBRATION

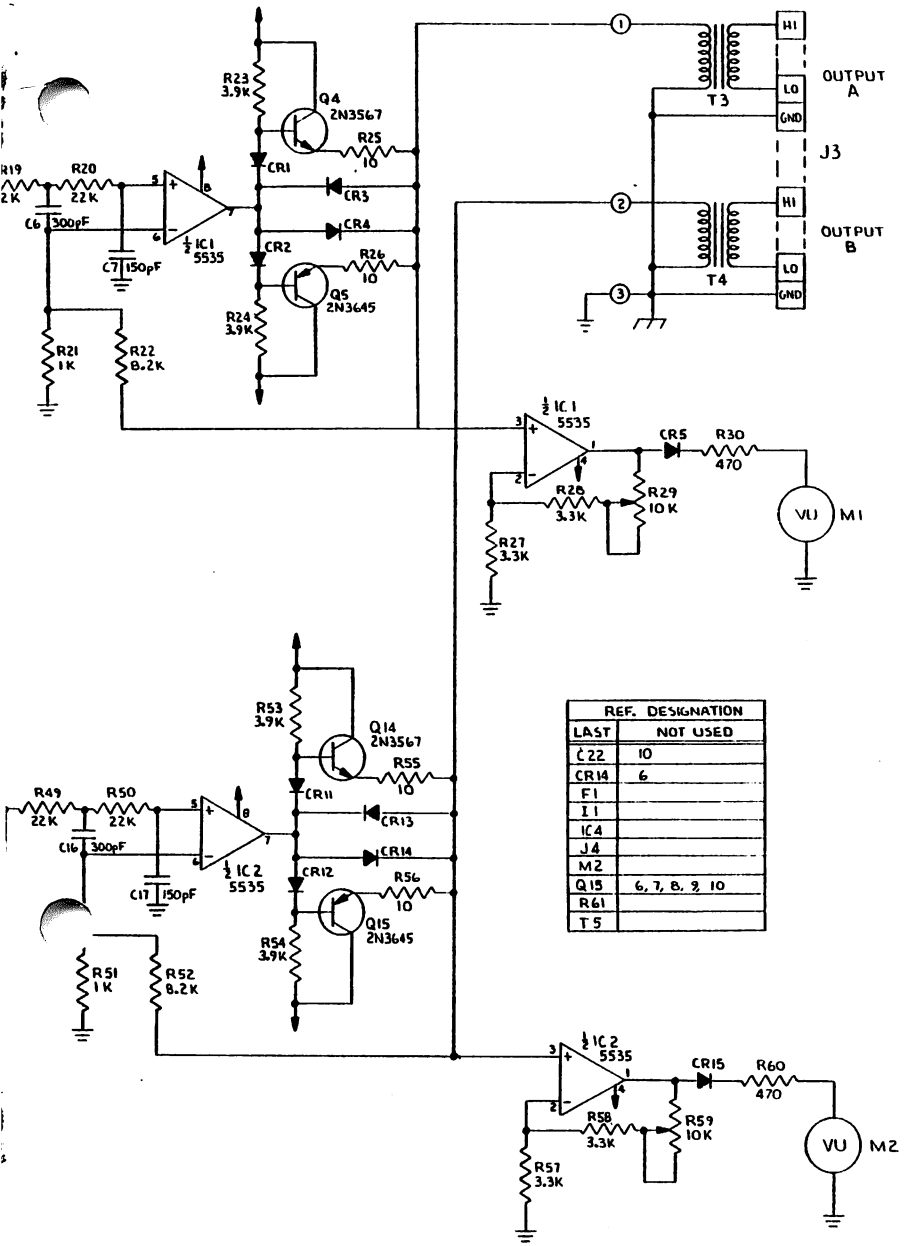
Power Switching

It is anticipated that power to the 377, and to the tape transport, if plugged into the 377, will normally be left on. Nevertheless, the front-panel fuseholder may be used to turn the power off by pressing the fusefolder cap "in-and-down."

Level and Equalization Adjustments

Front-panel LEVEL TRIM controls afford a ±5dB adjustment over the reproduce gain in each of the two channels. This accommodates tapes which have been under- or over-recorded by a few dB.


INPUT A
J1
T1
R1 220K
R2 330K
R3 1K
R4 220
R5 500
R6 20K
R7 2 Meg
R8 10K
R9 220K
R10 4.7K
R11 10K
R12 470K
R13 4.7K
R14 1K
R15 100
R16 10K
R17 3.9K
R18 5.1K 5%
R61 2.2K
C1 0.01
C2 220 6V
C3 4.7 20V
C4 100pF
C5 4.7 20V
C20 22 20V
HF
LF
GAIN CAL
LEVEL TRIM
Q1 SE4010
Q2 2N3645
Q3 SE4010
INPUT B
J2
T2
R31 220K
R32 330K
R33 1K
R34 220
R35 500
R36 20K
R37 2 Meg
R38 10K
R39 220K
R40 4.7K
R41 10K
R42 470K
R43 4.7K
R44 1K
R45 100
R46 10K
R47 3.9K
R48 5.1K 5%
C11 0.01
C12 220 6V
C13 4.7 20V
C14 100pF
C15 4.7 20V
Q11 SE4010
Q13 SE4010
J4
TRANSPORT
120 VAC
F1
L1
T5
C21 0.005
C22 0.005
CR7
CR8
CR9
CR10
C8 150 50V
C9 150 50V
C18 2.2 20V
C19 2.2 20V
IC3 7818
IC4 7918



REF. DESIGNATION	
LAST	NOT USED
C 22	10
CR14	6
F1	
I 1	
IC4	
J4	
M2	
Q15	6, 7, 8, 9, 10
R61	
T5	

377	DRAWN	M.D.	6 JAN 79
	CHECKED	JBW	1-8-79
	APPROVED		
TOLERANCES	MATERIAL / FINISH		
	—		

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Each of the two channels has separate and identical controls for level and equalization adjustment. A calibration procedure is outlined below.

IMPORTANT: THE FRONT-PANEL METERS ARE OF QUESTIONABLE ACCURACY AND INTENDED FOR PROGRAM MONITORING ONLY. PRECISE LEVEL AND EQUALIZATION CALIBRATION REQUIRES THE USE OF AN EXTERNAL AC VOLTMETER.

1. Heads should be thoroughly demagnetized and a Standard Tape of the proper speed and format threaded on the transport.

2. While reproducing the highest frequency on the Standard Tape, adjust the reproduce head azimuth for maximum output. If two slightly different azimuth peaks are noted for the two channels, a "split difference" compromise adjustment can be made. The alternative "phase difference" method yields a more accurate setting, but requires use of an oscilloscope. Bear in mind that azimuth and gap scatter differences between the two channels will degrade monaural performance, and it doesn't take much of a problem in this regard to make the mono program really sound like hell.

3. If the resonance of the reproduce head with its cable is near the top of the passband, as is usually the case for best signal-to-noise performance, a peak in response will be noted at the highest frequencies. R1 (and R31) on the printed circuit board is provided to damp this resonance. To determine whether its value is correct for the head used, set the H.F. equalization trimmer so that frequencies near 5kHz are flat with respect to the reference tone on the Standard Tape. Note the response at the highest frequencies and raise the value of R1 to increase, or lower R1 to decrease the top-end response.

4. Set the H.F. and L.F. controls for flattest response. If the Standard Tape track configuration is not the same as that of the reproduce head, "fringing" effects will cause erroneous low frequency response readings. This is a common problem when a full-track Standard Tape is reproduced with a 2- or 4- track head. In these cases, a "fudge factor" of about 2 or 3dB at 50Hz can be used, and requires that the response at 50Hz be adjusted 2 or 3dB above the level of the reference frequency. In some cases a more accurate "fudge chart" is supplied with the Standard Tape.

5. With the LEVEL TRIM control set at 0dB, the GAIN CAL trimmer is adjusted for the nominal line output level with the Operating Level tone on the Standard Tape. Meter calibration trimmers R29 and 59 can be adjusted to yield "0-VU" at nominal line output.

V. CIRCUIT DESCRIPTIONS

Circuit Notes

Circuitry for both channels of the 377 is contained on a plug-in assembly, removable from the front of the unit. The circuit for both channels is identical, and the layout of the schematic diagram makes comparison easy. Thus, only circuitry for Channel A will be described.

The regulated Power Supply utilizes "3-terminal" integrated circuit regulators and precious few additional components. Therefore this portion of the circuitry will not be described in detail, for obvious reasons.

Input Preamplifier

The input signal from the reproduce head may be routed either directly to the input stage (Hi-Z heads) or to the optional head input transformer (Lo-Z heads). The transformer option must be included if low inductance (3 to 6mHy) heads are to be used. Resistor R1 is selected to dampen head resonance and yield smoothest playback response. The resistor selection procedure is described in step 3 of the calibration procedure.

Transistors Q1 and 2 form a complementary feedback-pair input stage, with Q3 serving as an emitter-follower buffer. DC feedback is maintained through R8 and 9, bypassed at audio frequencies by C3. AC feedback is routed through equalization network comprised of C1 and R6 and 7.

Line Amplifier

R19 and 20 and C6 and 7 are part of a 2-pole active low-pass filter with cutoff beginning at about 30kHz. This filter aids in reducing noise and other spurious signals outside the audio spectrum. One-half of IC1 performs the voltage gain function of the Line Amplifier, with gain established by feedback resistors R22 and 21. Transistors Q4 and 5 and associated components provide the output current required for driving low impedance loads and long cables. Protection from output short circuits is afforded by diodes CR3 and 4. The chassis-mounted output transformer T3 provides the "balanced" line output.

Meter Drive Amplifier

The second half of IC1 is used as a buffer amplifier to drive the front-panel VU meter. Both gain and isolation are provided by IC1, and the resultant AC signal is rectified by CR5 to drive the DC meter movement. Meter calibration trim control R29 establishes the gain of IC1, and can be set to yield a meter indication of zero-VU for various Line Output levels.

VI. PARTS LIST

C1, 11	Capacitor, 0.01uF, 100V Mylar	Sprague 225P10391
C2, 12	" 220uF, 6V Tantalum	Matsuo 22IL-6301-227M7
C3, 5, 13, 15	" 4.7uF, 20V "	" DTSA-2002-475M
C4, 14	" 100pF Mica	Elmenco DM15-101J
C6, 16	" 300pF "	" DM15-301J
C7, 17	" 150pF "	" DM15-151J
C8, 9	" 150uF, 50V Electrolytic	Sprague TVA-1311
C18, 19	" 2.2uF, 20V Tantalum	Matsuo DTSA-2002-225M
C20	" 22uF, 20V "	" 22IL-2002-226M7
C21, 22	" 0.005uF, 1kV Ceramic	Sprague 5GA-D50
CR1-5, 11-15	Signal Diode, type 1N4151	
CR7-10	Rectifier Diode, type 1N4005	
F1	Fuse, 3A	
I1	Neon Power Indicator	Leecraft 36-EN-2113
IC1, 2	Integrated Circuit	Signetics NE5535N
IC3	" "	" 7818C
IC4	" "	" 7918C
M1, 2	Meter, "VU"	Modutec ME-DVU-000-AW
Q1, 3, 11, 13	Transistor	Fairchild SE4010
Q2, 5, 12, 15	"	" 2N3645
Q4, 14	"	" 2N3567
R5, 35	Resistor, Variable, 500 ohms	Beckman 89PR500
R6, 36	" " 20k	" 89PR20K
R7, 37	" " 2meg	" 89PR2MEG

R16, 46	Resistor, Variable, 10k	Allen-Bradley 70A1G032L103U
R29, 59	" " 10k	Beckman 91AR10K

ALL FIXED RESISTORS are 5%, 1/4-Watt carbon film type, value per schematic.

T1, 2	Transformer, Input (optional)	Beyer TR/BV 310 020 007
T3, 4	" Output	Inovonics part no. 109000
T5	" Power	" " " 135800

INOVONICS WARRANTY

Inovonics, Inc. products are warranted to be free from defects in material and workmanship. Any discrepancies noted within 90 days of the date of purchase will be repaired free of charge. Additionally, parts for repairs required between 90 days and one year from the date of purchase will be supplied free of charge, with installation billed at normal rates. It will be the responsibility of the purchaser to return equipment for warranty service to the dealer from whom it was originally purchased unless prior arrangement is made with the dealer to inspect or repair at the user's location.

This warranty is subject to the following conditions:

1. Warranty card supplied with the equipment must be completed and returned to the factory within 10 days of purchase.

2. Warranty is void if unauthorized attempts at repair or modification have been made, or if serial identification has been defaced, removed, or altered.

3. Warranty does not apply to damage caused by misuse, abuse, or accident.

4. Warranty valid only to original purchaser.

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